**ABSTRACT**

The vast collection of CCD images and photographic plate archives available from the world-wide archives and telescopes is still insufficiently exploited. Within the EURONEAR project we designed two data mining software with the purpose to search very large collections of archives for images which serendipitously include known asteroids or comets in their field, with the main aim to extend the arc and improve the orbits.

In this sense, “Precovery” (published in 2008, aiming to search all known NEAs from archives via IMCCE’s SkyBoT server) and “Mega-Precovery” (published in 2010, querying the IMCCE’s Miriade server) were made available to the community via the EURONEAR website.

Mega-Precovery aims to search one or a few known asteroids or comets in a mega-collection including millions of images from some of the largest observatory archives: ESO (15 instruments served by ESO Archive including VLTI), NVO (8 instruments served by U.S. NVO Archive), CADC (11 instruments, including HST and Gemini), plus other important instrument archives: SDSS, CFHTLS, INT-WFC, Subaru-SuprimeCam and AAT-WFI, currently adding together 39 instruments and 4.3 million images (Mar 2014), and the Mega-Archive is growing!

Here we remind the main capabilities of Mega-Precovery, presenting some of its most important results and projects. Particularly, the following search capabilities will be added to soon: the ING archive (all imaging cameras) will be included and new search options will be made available (such as query by orbital elements and by observations) in order to target new Solar System objects such as Virtual Impactors, bolides, planetary satellites, TNOs (besides the comets added recently). In order to characterize the archives, we introduce the “$\Omega A$” factor (archival etendue) proportional to the $\Omega A$ (etendue) and the number of images in an archive.

With the aim to enlarge the Mega-Archive database, we invite the observatories (particularly those storing their images online and also those owning plates archives which could be scanned on request) to contact us in order to add their instrument archives (consisting of an ASCII file with telescope pointings in a simple format) to our Mega-Precovery open project.

**MEGA-PRECOVERY STRUCTURE**

Mega-Archive database which includes the individual instrument archives, namely the observing logs pointing to the science CCD images or plates available from a collection of instruments and telescope around the globe. The Mega-Archive is an open project allowing other instrument archives to be added later for exploration by anybody who would like to contribute [1].

Mega-Precovery software for data mining the Mega-Archive for the images containing one or a few catalogued objects (NEAs, PHAs or other Solar System Objects) included in a local daily updated MPC database. The Mega-Precovery software is written in PHP, being embedded on the EURONEAR website as a public access application under the observing tools section [1].

The output consists in a list including the images predicted to contain the queried object(s). The results are displayed both in the web interface (visible at the end of the run) and sent via e-mail to the user (in case this option was selected). The user can search the images in the online instrumental archive, then download, inspect and measure the candidate image to hold the selected). The user can search the images in the online instrumental archive, at the end of the run) and sent via e-mail to the user (in case this option was queried object(s). The results are displayed both in the web interface (visible at the end of the run) and sent via e-mail to the user (in case this option was selected).

We highlight in blue all instruments with $\Omega A > 500\text{ m}^2 \times \text{deg}^2$.

**MEGA-PRECOVERY WEB INTERFACE**


**RUN SAMPLES AND FEW IMPORTANT RESULTS**

**Astrometry** - fast targeted search of some of the most important objects, such as PHAs or Vs. However, all asteroids and comets can be searched using MegaPrecovery. Examples of important orbital improving using EURONEAR data mining tools and Subaru SuprimeCam archive:
- 2012 RX16: 3 months arc extended to 8 years (MPS 492076);
- 2007 TX15: 3 month arc extended to 1.5 years (MPS 505407);
- 2011 GM44: 1 month arc extended to 5 years (MPS 506465);
- 2012 KC6: 2 month arc extended to 4 years (MPS 504077);
- 2012 HC34: 6 month arc extended to 10 years (MPS 504077);
- 2009 UE2: 5 month arc extended to 2 years (MPS 505424);
- 2011K19: 2 month arc extended to 7 years (MPS 506468).

**Photometry** - determine the lightcurves of asteroids based on existing images.
- Example: 2006 KV89: 40 images in the interval 2455535+[0.73; 0.90]

**FURTHER IMPROVEMENTS**

New capabilities:
- query by orbital elements;
- query by observational arc;
- Database:
  - Daily updates of MegaArchive (in work!)
- Interface:
  - generate link to direct download the images;
  - select time interval for querying;
  - provide ‘.cfg’ files to reduce images in Astrometria.

**REFERENCES**